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The High Prevalence of Colorectal Neoplasms in Preoperative Patients with Abdominal Aortic Aneurysm or Peripheral Artery Disease

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Objective. *In Japan, the incidence of both colorectal carcinoma and vascular disease is increasing. We screened preoperative patients with abdominal aortic aneurysm (AAA) or peripheral artery disease (PAD) for colorectal cancer.*
Design of study. *This study was retrospective and cross-sectional.*
Materials. *The subjects were 492 patients admitted for elective surgery of AAA or PAD.*
Methods. *The patients underwent immunochemical faecal occult blood tests (FOBT) before operation, and those with positive results underwent investigations for colorectal neoplasm. We compared the results with that of screening programmes performed on the general population.*
Results. *Of the 408 patients that underwent FOBT, 104 (25.5%) were positive. After colonoscopy, six (1.5%) had colorectal carcinoma and 16 (3.9%) had advanced adenoma. These values were several folds higher than that for the general population in Japan.*
Conclusions. *Patients with AAA or PAD carry a high risk for colorectal neoplasm.*

Keywords: Abdominal aortic aneurysm; Peripheral artery disease; Colorectal neoplasm; Screening.

Introduction

In vascular surgery, the presence of cancer in patients scheduled to undergo surgery for abdominal aortic aneurysm (AAA) or peripheral artery disease (PAD) usually leads to a marked change in the treatment strategy. In 1994, among the age-adjusted mortality due to cancer, colorectal cancer (CRC) ranked fourth in males and second in females in Japan. The incidence of CRC and mortality due to CRC are still increasing. The incidence of both AAA and PAD is also increasing due to the increase in atherosclerosis.

In this study, we have focused on CRC because CRC is an intra-abdominal cancer increasing in the recent years. We used a noninvasive and a simple faecal occult blood test (FOBT) for screening, to find the prevalence of CRC in preoperative vascular patients and to show the advantage of routine screening for CRC.

Materials and Methods

During the 7 years from January 1997 to December 2003, 562 patients were admitted to the Department of Vascular Surgery, The University of Tokyo Hospital as new patients to undergo surgery for AAA or PAD. Seventy patients (12.5%) underwent emergency operation, mainly because of aneurysm rupture or acute limb ischaemia, and were excluded from the study, leaving 492 patients who underwent elective surgery.

After approval of the local research ethics committee and with informed consent, these patients underwent FOBT soon after admission as preoperative screening for colorectal lesions. To check faecal occult blood, immunochemical hemagglutination test has been adopted in the Laboratory Department of The University of Tokyo Hospital.[1] Those with a positive test underwent further investigation of the colon before surgery for AAA or PAD. Barium enema was

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performed initially, and those with identified lesions underwent colonoscopy.

Histological classification of colorectal neoplastic lesions was based on World Health Organization criteria.[2] Advanced adenoma was defined as an adenoma with size 10 mm or larger, high-grade dysplasia, or a villous component of more than 20%. Carcinoma was defined as malignant cells invading beyond muscularis mucosa. Advanced neoplasia was defined as both carcinoma and advanced adenoma. Patients with intramucosal carcinoma or carcinoma in situ were defined as having adenoma with high-grade dysplasia. The patients' records were assessed retrospectively. Fisher's exact test was used to compare the prevalence between two screening programmes, and p values below 0.05 were defined as significant.

Results

Of the 492 patients admitted for elective operation for vascular lesions, 248 had AAA, and 244 had PAD. Because one aim of the study was to clarify the prevalence of colorectal diseases in preoperative patients with arterial disease, 51 patients with a history of colonic polyp or cancer did not undergo FOBT because they were already being followed up for colorectal lesions. Therefore, they were not enrolled in the study. This left 441 patients admitted for elective surgery for arterial lesions, without a history of colorectal neoplastic disease. Four hundred and eight of these patients underwent FOBT. Thirty-three patients were unable to undergo faecal tests for various reasons (92.5% screening rate). The baseline characteristics of 408 patients are shown in Table 1. Of the 408 patients that underwent FOBT, 104 (25.5%) were positive. There were no differences in the baseline characteristics between the groups with positive or negative FOBT.

Thirty-seven of the 104 patients with positive FOBT, did not undergo further study of colorectal lesions because of patients refusal or acute worsening of the vascular lesion after admission (64.4% surveillance rate).

After further surveillance, which were performed in 67 patients, 6 were diagnosed as having colorectal cancer, 16 as having advanced adenoma, three of which was carcinoma within the mucosal layer, 17 as having other kinds of colorectal polyps and the remaining 28 had no neoplastic lesions. The results are shown in Fig. 1. The positive predictive value of an FOBT for advanced neoplasia was 32.8% (22/67).

Three colon cancer patients underwent open laparatomy for CRC first, followed by vascular surgery, and one patient underwent open laparotomy for CRC after vascular surgery. One patient was unable to undergo surgical treatment of CRC because of distant metastasis to the lungs and liver. The remaining patients with CRC or adenoma had their colorectal lesions resected endoscopically.

Table 1. Baseline characteristics of 408 patients that underwent faecal occult blood test

Age (Mean ± SD)	70.6 ± 8.7
Sex (Male: Female)	332:76
Hypertension	271 (66.4%)
Diabetes mellitus	122 (29.9%)
Hyperlipidemia	120 (29.4%)
Smoking	332 (81.3%)
History of ischemic heart disease	107 (26.2%)
History of cerbrovascular disease	81 (19.8%)

Discussion

FOBT is a simple non-invasive test to detect colorectal neoplasm. In randomized controlled trials, FOBT has been shown to reduce mortality from colorectal cancer by 15−33%, and since then FOBT has been established as a screening test.[3–5] Although a recent study demonstrated sigmoidoscopy to be more effective than FOBT, it is not yet feasible for population based screening or preoperative screening before vascular surgery in Japan.[6] In Japan, cases of positive FOBT are reported to comprise 7.3% of the population, and cases of CRC, including those limited to the mucosal layer, were found in 0.15% of the population.[7] In our study, if we include intramucosal carcinoma as colorectal carcinoma, another three patients with advanced adenoma would be considered to have colorectal carcinoma, resulting in a CRC rate of 2.2%.

In our study, if we use the number of patients undergoing FOBT (408 patients) as a denominator, 25.5% had a positive FOBT, 1.5% had colorectal carcinoma, and 5.4% had advanced neoplasia (Table 2). [8] These values were all significantly higher in our study ($P < 0.001$ for positive FOBT, 0.0048 for CRC and 0.02 for advanced neoplasia).

Exclusion of 37 patients (36%) may bias interpretation of the data, but we have used 408 patient as the baseline population on a intention to treat basis, and therefore, the prevalence of advanced neoplasia and CRC may become higher but not lower.

There are some possible explanations for this high rate of advanced neoplasm in preoperative vascular disease patients. First, there is a possibility that vascular

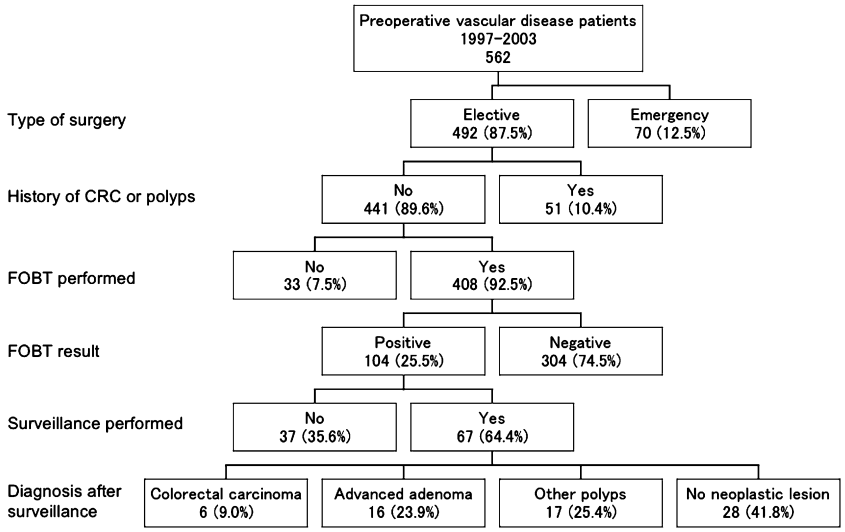

Fig. 1. Flow chart showing the results of colorectal screening in patients before vascular surgery.

patients are of older age because the incidence of most of the neoplasm is known to increase with age. Although age distribution in Morikawa's study is not defined, Segnan's study only included those aged 55–64, and if we restricted the patients in this study to 55–64 years (78 patients), the positive FOBT rate was 29% and advanced neoplasia rate was 7.7% which was still higher than that reported by Segnan (4.3% and 1.7% respectively).[6]

Second, there was a large difference in sex ratio. Morikawa's study included 6111 females (28.0%), whereas our study included only 76 (18.6%) because of the high male prevalence of vascular disease. Although there was no significant difference in the rate of positive FOBT and advanced neoplasia in our study (male vs. female: 24.7% vs. 29.0% for positive FOBT, 5.1% vs. 6.6% for advanced neoplasia), this may be the result of the low number of patients.

The presence of colorectal lesions may change the strategy for treating vascular lesion for a number of reasons. First, there is a problem in the order of surgery if both colorectal lesion and vascular lesion such as AAA or aorto-iliac occlusive disease require open laparotomy. There are many studies concerning the treatment of simultaneous disease, and although no standard has been established regarding the issue, it is important to perform the surgery safely, decreasing the possibility of life-threatening complications. Second, although PAD of lower limb may not involve laparotomy, patients are likely to receive anticoagulation and anti-platelet therapy after revascularization, and this may lead to bleeding and anaemia in the presence of colorectal cancer or polyps.

Incidence of CRC in patients with AAA is reported to be 0.5 to 4.6%,[9–16] and to our knowledge, there are no reports on CRC prevalence in patients with PAD. These values include vascular lesions found incidentally during a survey of known CRC, and therefore the actual incidence of CRC may be lower. In our study, the prevalence of CRC in patients with AAA or PAD was 1.5%. Considering that the screening rate was 92.5% and the surveillance rate was 64.4%, the actual prevalence of CRC and adenoma could be higher than the results obtained in this study. As with other studies regarding screening programmes, an increase in screening and surveillance rates increases the benefit of the screening itself.

Whatever screening method we choose, we are sure that preoperative patients for vascular surgery have high risks for CRC. Unfortunately, we were unable to follow up the patients with negative FOBT, regarding cancer. Therefore, the true sensitivity and specificity of FOBT cannot be calculated, and its superiority over other screening methods is not known.

In conclusion, preoperative vascular disease patients with AAA or PAD have a high risk for colorectal

Table 2. Comparison of the results of faecal occult blood test (FOBT), between present study and a general screening test in Japan

	Present study ($n = 408$)	Morikawa[8] ($n = 21805$)	P value
Sex (Male)	336(82.4%)	15694(72.0%)	
Mean age	70.6 ± 8.7	48.2 ± 9.3	
Positive FOBT	104(25.5%)	1231(5.6%)	<0.0001
Colorectal carcinoma	6(1.5%)	79(0.4%)	0.0048
Advanced neoplasia	22(5.4%)	727(3.3%)	0.02

neoplasm. Screening should be considered in these patients.

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